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Can a spaced repetition software aid dental students? A pilot study

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1 | PROBLEM

Most dental students learn information via passive exposure of material followed by testing for the purpose of measuring short-term knowledge acquisition. Unfortunately, a significant amount of material is quickly forgotten.

2 | SOLUTION

Research has demonstrated that the act of recalling information through questions or testing causes the information to be strengthened in memory. More importantly, testing encounters that are spaced and repeated over time (spaced distribution) enhance retention.[1,2] Spaced repetition software (SRS) is designed to organize information for spaced repetition, usually with flashcard-like templates, automatic scheduling, and basic collaborative capabilities. Anki (https://apps.ankiweb.net/), an open-source SRS, was used in a second-year oral and maxillofacial pathology course as a studying tool to enhance learning and improve retention of course knowledge. Course instructors created the Anki decks (collections of digital flashcards) in five modules over the duration of the course and distributed them with the learning management system, Canvas (Instructure, Inc.). Approximately 40 cards were used per module, including some with in-depth discussions of the correct answer. Students completed a survey to give feedback on their experience; this survey also allowed for uploading a copy of their local Anki database for usage analysis.

3 | RESULTS

A total of 115 of 128 students participated in the survey (90%) with generally positive feedback (Figure 1). Of these respondents, 87 students (76%) were able to upload a copy of their local Anki database for analysis, including the number of reviews per day (Figure 2). Of students who had installed the cards, the number of reviews steadily decreased during the course, and the average percentage of "overdue" cards (i.e., cards that were past their scheduled review date) was 84%, indicating that students were generally not using the software's spaced repetition functionality.

4 | LESSONS LEARNED

Although students were very receptive to the use of Anki, suggesting that they recognize the benefit of self-testing (a form of active retrieval), they may not have understood the benefit of spaced repetition itself. In the open-text parts of the survey, some students noted that they used Anki's "browse" function (primarily designed for editing Anki material) to rapidly review the cards, which does

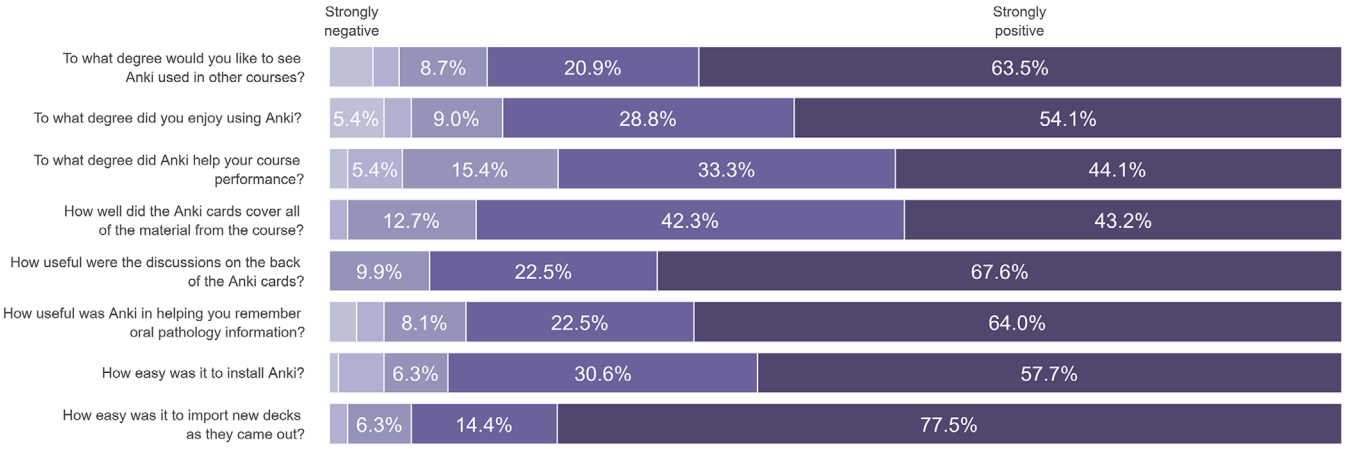

FIGURE 1 Survey results for Likert-style questions

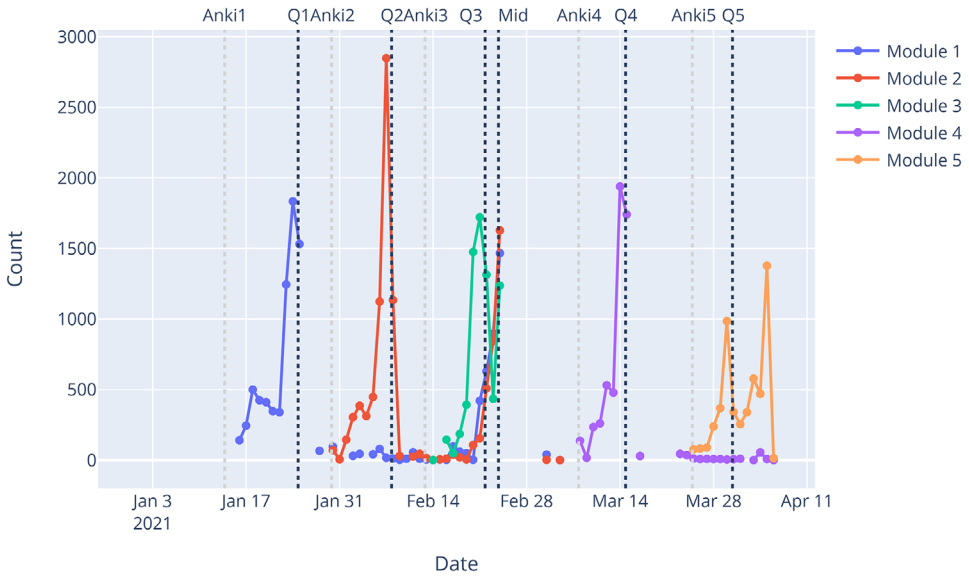

FIGURE 2 Total number of reviews per day (by deck)

not benefit from spaced repetition and cannot be tracked by Anki. This can be understood through the Technology Acceptance Model (TAM),[3,4] which argues that an individual's behavioral intention to use a new educational tool is regulated by Perceived Usefulness and Perceived Ease of Use.

Previous studies show that TAM explains about 40%[5] of the variance in an individual's intention to use the new technology. While most studies assessing spaced repetition use self-reported usage data or generic data provided by an application, our data are detailed enough to allow us to design strategies targeting Perceived Usefulness and Perceived Ease of Use that could improve spaced repetition use and thereby improve learning gains. This includes introducing spaced repetition earlier in the curriculum while also stressing the benefits of spaced versus massed repetition.

We suggest that dental schools using spaced repetition evaluate spaced repetition statistics to ensure that the software is being used as designed.

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